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(54) Title: METHOD AND APPARATUS FOR COPY PROTECTION OF COPYRIGHTED MATERIAL ON VARIOUS RECORDING MEDIA

BASIC CONDITIONAL PLAY SYSTEM

IF A IS HIGH AND B IS LOW, AN INHIBIT PLAY COMMAND IS GENERATED
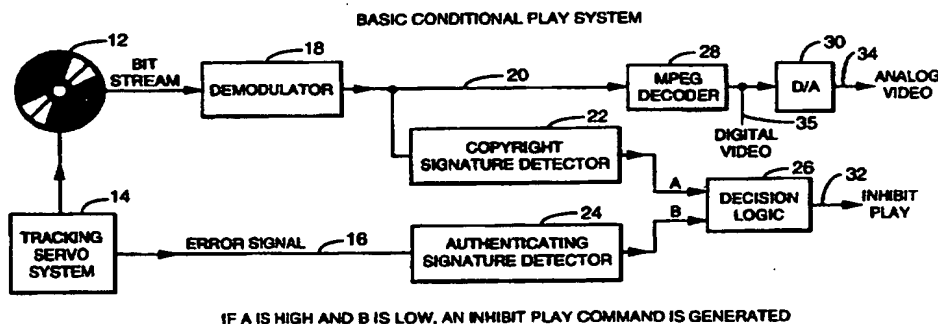
(57) Abstract

A method and apparatus for copyright protection for various optical recording media such as Digital Video Discs (DVDs) and magnetic tape cassette systems, such as W-VHS, use a combination of a Copyright Signature Signal and an Authenticating Signature to permit the player to handle either copy-protected or non-copy-protected media, in a manner that is difficult to compromise. Both a Copyright Signature Signal and an Authenticating Signature are recorded on the media only when copy-protection is required. The nature of this Authenticating Signature is such that it will not be transferred to illicit copies made on recorders. When either an original protected or an original non-protected medium is played, the presence or absence of the Authenticating Signature causes the player to correctly play the program video. All original media therefore play normally. When a copy of a non-protected medium is played, the absence of the Copyright Signature Signal also causes the player to correctly play back the video signal data. However, when a copy of a protected disc or cassette is played, the absence of the Authenticating Signature causes the recorder or player to prohibit the medium from playing normally.

METHOD AND APPARATUS
FOR COPY PROTECTION
OF COPYRIGHTED MATERIAL ON VARIOUS RECORDING MEDIA

CROSS REFERENCE TO RELATED APPLICATIONS

This application is related to Provisional Application Serial Number 60/017,736 filed John O. Ryan on May 15, 1996 entitled METHOD AND APPARATUS FOR COPY PROTECTION OF COPYRIGHTED MATERIAL ON VARIOUS MEDIA. This application is related to patent application serial number 08/473,047 ('047) entitled METHOD AND APPARATUS FOR COPY PROTECTION FOR VARIOUS RECORDING MEDIA USING A VIDEO FINGER PRINT BY John O. Ryan and Gregory C. Copeland filed on June 7, 1995 which is a Continuation-in-Part of application United States Patent Number 5,513.260 ('260), issued April 30, 1996 entitled METHOD AND APPARATUS FOR COPY PROTECTION FOR VARIOUS RECORDING MEDIA by John O. Ryan and patent application serial number 08/294,983 ('983) filed August 24, 1995 entitled A VIDEO FINGER PRINT METHOD AND APPARATUS. This application is also related to application Serial Number 08/294,983 ('983), filed 08/24/94 entitled A VIDEO FINGER PRINT METHOD AND APPARATUS. This application is also related to US Patent Number 5,574,787 ('787), issued November 12, 1996. entitled APPARATUS AND METHOD FOR COMPRHENSIVE COPY PROTECTION FOR VIDEO PLATFORMS AND UNPROTECTED SOURCE MATERIAL. This application is also related to US Patent Number 5,590,194 ('194). issued 31 December 1996 entitled METHOD AND APPARATUS FOR SCRAMBLING A VIDEO SIGNAL WITH FULL NETWORK TRANSMISSION AND RECORDING CAPABILITY.

BACKGROUND OF THE INVENTION

The optical compact disc (CD) is universally recognized as a superb medium for storage of digital data. Its high packing density, low manufacturing cost and relative immunity to mishandling are unmatched by other media. The success of the CD as a carrier of high fidelity audio is likely to be repeated in the realm of Multimedia. where the technology has been

adapted to the broader task of storing digitized audio, video and alphanumeric information for a variety of purposes, conforming to a plethora of standards such as DVD, CD-ROM, CD-Video, CD-I, etc.

5   Until recently, owners of copyrighted works released on optical media have not had to contend with the high levels of unauthorized copying that occur in the videocassette and audiocassette domains. This was almost entirely due to the large capital investment costs associated with replicating optical discs, which created substantial financial barriers to piracy. However, compact disc recording machines capable of making perfect copies of data from 10   pre-recorded CDs and CD-ROMs are now available for a few hundred dollars. Digital Versatile Disc recording devices for consumer use are also expected to become available within 2 years. This will create a serious conflict between software producers' need to sell their product for $20+ to make a profit, and consumers' ability to make a perfect copy for the price of a blank disc, 15   projected to be in the $5 to $10 range soon.

The fundamental problem solved by this invention is to ensure that end users can only enjoy a software manufacturer's products by playing legitimately manufactured discs or cassettes.

One approach to the piracy problem would be to include special anti-copy 20   circuitry within disc recorders similar to the Serial Copy Management System (SCMS) developed for the Digital Audio Tape (DAT) medium. With this scheme the disc recorder would look for a special *copy-prohibit* instruction inserted somewhere in the digital data, and on finding it, would stop recording. However, such a system offers very limited protection. Even when 25   the SCMS system was first proposed for the DAT medium, it was fully appreciated that it presented little protection from professional or even amateur pirates, who, knowing the data format, could, and subsequently did, build inexpensive "black boxes" (electronic circuits) to remove the copy-prohibit instruction, thereby enabling the recorders to make unlimited copies.

30   The applicant believes that all anti-copy systems relying on simple copy-prohibit instructions inserted in the data stream can be defeated by black boxes of the same order of complexity and cost as that of the circuitry within

the disc recorder that looks for these instructions. Such systems are therefore of limited effectiveness. The black box would be connected in line between a disc player and a disc recorder and would look for the special copy-prohibit instructions in the data stream and simply remove or modify these instructions. It is to be expected. therefore. that if this kind of anti-copy system were adopted. inexpensive black boxes would proliferate.

A further difficulty with this approach to copy protection is the need to ensure that all recorder manufacturers include the necessary detection circuitry in their products. Some manufacturers may not comply, perhaps in the expectation of increasing their market share. The presence of even a small percentage of non-complying machines in the marketplace could jeopardize the viability of this type of copy-protection scheme.

For the foregoing reasons, there is a need for a copy-protection system for optical disc media that provides a high level of protection to software rights owners. that is immune to black boxes and that is not compromised by the refusal of a few hardware manufacturers to comply with the standard.

The various video copyright protection systems implemented or proposed to date have in one way or another focused on preventing recorders from making usable copies of protected material. There are two general classes of such systems -- called respectively, *unilateral* and *bilateral* copy-protection systems.

Unilateral copy-protection systems. such as described in US Patent 4,631,603 by Ryan. incorporated by reference. are systems designed to work with large pre-existing installed bases of VCRs and TV sets. Unilateral systems must identify and successfully exploit some basic difference between the way these pre-existing recorders and TV sets utilize the video signal. Since the pre-existing recorders were designed to be able to record all video signals conforming to the standard in use (NTSC e.g.), unilateral copy-protection systems therefore must generate *non-standard video signals*. The requirement that these non-standard protected video signals be playable on all existing recorders and TV sets places such severe design constraints on

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unilateral systems that a level of effectiveness approaching 100% is very difficult to achieve.

Bilateral copy-protection systems require that a special detector circuit be included in all recording devices capable of recording the video standard of interest (NTSC, PAL, etc.) and therefore represent a viable alternative to unilateral systems *only* if they can be implemented at the introduction of new formats so that 100% compliance becomes possible. This detector circuit searches for a special *copy-prohibit* signal embedded in protected video signals and on finding it, causes the VCR to stop recording. Bilateral copy-protection systems can be designed that are essentially 100% effective, and for this reason they are preferred over unilateral systems.

However, for a bilateral system to have maximum value, it must be designed in as an integral part of a new recording format and the special detector circuit must be included in *all* manufactured recorders. There may be legal or contractual difficulties in ensuring the cooperation of all recorder manufacturers. If a manufacturer offers non-compliant recorders for sale, these will be purchased by video pirates, and will be used to make illicit copies of protected programs for sale or rental. This necessity of ensuring the cooperation of 100% of recorder manufacturers is a weakness of all bilateral copy-protection systems proposed to date. Examples of bilateral copy protection systems are described in US Patent 5,314,448 ('448) issued May 24, 1994 by John Ryan entitled COPY PROTECTION FOR HYBRID VIDEO TAPE RECORDING AND UNPROTECTED SOURCE MATERIAL and US Patent 4,907,093 ('093) by John Ryan entitled METHOD AND APPARATUS FOR PREVENTING THE COPYING OF A VIDEO PROGRAM. The '448 and '093 patents are incorporated herein by reference.

SUMMARY OF THE INVENTION

The object of the invention is a system to protect program material - whether electronically transmitted or prerecorded - against copying by future tape or disc based analog or digital recorders.

According to the invention, a Conditional Play System provides copy-protection for previously recorded material delivered on various media, for

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example compact disc media or digital cassette formats. The invention to be described is applicable to many different media and one of average skill in the art could readily adapt the teachings of this invention to other media

The invention overcomes the disadvantages of the above-described
5   unilateral and bilateral system. The Conditional Play System does not attempt to prevent recorders from copying the data from protected discs or cassettes. Instead, it is a method by which players can determine whether a particular disc or cassette is a legitimate original or an illicit copy. If legitimate, the player plays the disc or cassette normally. If not legitimate,
10   the player shuts down and may display an appropriate copyright warning message.

An essential feature of this invention is the inclusion of a special subsystem within playback machines which will not allow the media to be played back. if the subsystem determines that the recording is a copy.
15   The description which follows will be addressed to both disc and cassette applications.

The Basic Conditional Play System uses two separate signatures to achieve its goal. The first, called the *Copyright Signature*, is a special signal added to *all* video material to be copy-protected, whether delivered via optical
20   disc, videocassette, or transmitted by a cable or satellite Pay-Per-View service. For security reasons, this signal is added within the active region of the video signal - otherwise it could be easily removed. It should also be invisible under all reasonable combinations of viewing conditions and image content. This Copyright Signature is sometimes referred to as a fingerprint signal or a
25   watermark signal. The Copyright Signature should be unambiguously detectable by an inexpensive special circuit within a player and should survive several generations of copying as well as various signal transformations such as compression and conversion between analog and digital modes.

30   When protected programs are to be distributed on physical media (optical discs, magnetic discs, reel to reel magnetic tape or magnetic tape cassettes) as distinct from being broadcast. in addition to the Copyright

Signature. a unique *Authenticating Signature* is also impressed on the master disc or videotape during duplication. The nature of this Authenticating Signature is such that it will not appear on the player's video output during playback and therefore will not be recorded onto an illegal copy. However, the

5   presence or absence of this Authenticating Signature must be readily detectable by a special circuit within each player during playback.

The basic Conditional Play System utilizes these electronic signatures to provide information to a simple logic circuit in each player. which makes a decision as follows:

10   *If a Copyright Signature is detected during playback of a disc or cassette, that disc or cassette is allowed to continue playing, if, and only if, the Authenticating Signature is also detected. If a Copyright Signature is not detected, the disc or cassette videocassette will also be allowed to continue playing.*

15   During playback of an original or a copy of a *non-protected* program, the Copyright Signature will not be detected, so the disc or cassette will be allowed to play normally.

During playback of an original *protected* program. both the Copyright Signature and the Authenticating Signature will be detected, so the disc or

20   cassette will also be allowed to play normally.

On attempting to play an illicit copy of a protected program, the Copyright Signature will be detected, because, as previously explained, this signature will be passed on to all copies, even through several generations of copying. If this illicitly copied program originated on disc or cassette, the

25   Authenticating Signature would not have been passed on to the illicit copy and if this illicitly copied program came from a broadcast there would not have been an Authenticating Signature associated with it, so in either case the illicit copy would not contain an Authenticating Signature. As a consequence. the decision circuit in the recorder or player would *not* allow this

30   copy to be played.

Clearly, the Conditional Play System would not be compromised if a minority of player manufacturers make players without the special signature

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detection and decision circuitry, because illicit copies could not be played on the majority of players in the marketplace. A video pirate would have to advertise his products as being playable on a limited subset of players.

Under the basic Conditional Play System described above, non-compliant players would be able to play original protected videocassettes as well as illicit copies, and such players therefore might be perceived as more valuable to some consumers than compliant players. In order to discourage manufacturers from making non-compliant players, an Enhanced Conditional Play System will be described below which would not permit playing of original protected programs on non-compliant players, while retaining all the features of the basic system. Under the enhanced system, non-compliant players might not attract sufficient buyers to encourage manufacturers to produce such machines.

The Enhanced Conditional Play System

The significant difference between the basic system and the enhanced system is that the program material recorded on the discs or cassettes is scrambled (in addition to applying the Copyright and Authenticating Signatures) and the descrambling circuitry would be an integral part of the copy-protection sub-system built into all players. Player manufacturers would need to acquire a license to incorporate the descrambling circuitry and a condition of obtaining this license could be a commitment to include the entire copy-protection sub-system. Players that did not have this copy-protection circuitry therefore *could not play* protected discs or cassettes.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram of a disc player incorporating the basic conditional play system.

Fig. 2 is a block diagram of a disc player incorporating the enhanced conditional play system.

Fig. 3 is a block diagram of a cassette duplicator or a disc mastering machine configured to enable an enhanced conditional play system.

DETAILED DESCRIPTION OF THE INVENTION

The Authenticating Signature

During manufacture of the master disc, an Authenticating Signature is impressed on the disc in a manner that cannot be read by a disc player's normal optical pickup, but which can easily be detected by other means. The nature of this Authenticating Signature is such that it is faithfully transferred to all production disks made from this master. However, if an illicit copy of a production disc is made using a back to back player and recorder, the copy may contain a faithful replica of the disc's program data, but the Authenticating Signature will not be transferred to the copy.

For disc applications, the Authenticating Signature is preferably impressed on the master disc by radially position-modulating the writing head that creates the master disc, by a few tens of nanometers peak-to-peak about the head's normal position. This Authenticating Signature can then be read

in the player with a minimal increase in player complexity by taking advantage of the player's existing radial tracking servo system, as will now be described.

In all disc players, the optical reading head is maintained on track by a sophisticated error detection systems, as a normal part of the player's function. If, for example, the head moves slightly toward one or other side of the track, or the track moves from under the head due to an off center spindle, an error is detected and, after amplification, is applied to the radial actuator to re-center the head on the track. Since the optical reading head must also track a deliberately induced radial position-modulation defining an Authenticating Signature, this error voltage therefore would contain a signal component corresponding to the signature, along with other signals corresponding to elliptical errors and the like. Therefore, by appropriate processing of this error voltage, the Authenticating Signature can be detected.

The position-modulation signal may be a simple sinusoid of frequency such that either an integral number of cycles is impressed during each revolution of the disc, or one complete cycle is impressed during an integral number of revolutions of the disc. In either case, extraction of the Authenticating Signature from the various other tracking error signals is simplified. A relevant type of abnormal scanning is described in US Patent 5,247,507 by Morimoto (incorporated by reference) that describes a wobble of the normal tracking signal causing the tracking to meander in a sinusoidal path about a mean frequency.

For cassette applications, a convenient method of applying an Authenticating Signature is to add to, or modify, the existing control track signal in a magnetic tape control track. For a tape control track this signal is basically a differentiated rectangular pulse at frame frequency (30 Hz). On playback, it has the appearance of consecutive positive and negative raised cosine pulses. The positive pulses only are used to control the servo system. An Authenticating Signature can therefore be conveniently realized by position-modulating the negative pulse, plus or minus one millisecond or so about its nominal position. It is a straightforward matter to detect this non-

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standard control track to authenticate the cassette and clearly, since the control track is separate from the video, the authenticating signature would not be transferred to an illicit copy.

The Copyright Signature

5   Video watermarking, also known as video steganography, is the general field concerned with adding invisible, difficult to remove tracing signals to video signals.   Ideally, the Copyright Signature would be a particular watermarking method chosen to have the following characteristics: Invisible under all reasonable viewing conditions. No degradation to the video signal.

10   Very difficult or impossible to remove without seriously degrading the video signal. Low cost of detection.

By way of example, one watermarking method would be to generate a pseudo-random binary sequence, with a bit period and repetition rate optimized for the medium.   This binary signal is then multiplicatively

15   combined with the video signal using a scaling factor low enough to ensure that the signature is invisible under all reasonable combinations of viewing conditions and image content. If this signature is stationary with respect to the displayed image, it is likely that the signature need only be some 50 dB below the video signal to be invisible.   This Copyright Signature can be

20   detected in the player by generating an identical pseudo-random sequence and using correlation techniques.

The Scrambling Method.

A scrambling method sufficient to substantially reduce picture quality or entertainment value will suffice for this application. It is not necessary

25   that the scrambled picture be completely obliterated. An easy to implement method for the disc or cassette formats is to interchange the two color-difference signals periodically and randomly in the recorder. Such a method is described in US Patent 5,590,194 ('194) by Ryan issued on December 31, 1996 entitled METHOD AND APPARATUS FOR SCRAMBLING A VIDEO

30   SIGNAL WITH FULL NETWORK TRANSMISSION AND RECORDING CAPABILITY. The '194 patent is incorporated by reference. This scrambling method can be accomplished at minimal cost and with no loss of signal

quality. The switching rate should be a few cycles per second on average, for maximum visual effectiveness. Other scrambling techniques could also be the Enhanced Conditional Play System.

A very effective and efficient system can be realized by also using the control track signal in a cassette format or the radial track signal in a disc format to convey descrambling key information, as an integral part of the Authenticating Signature. If a random, color-difference signal interchange scrambling, as described above, is used. a delayed negative control track pulse or a modulated radial track signal could indicate that the color difference signals have been swapped and an advanced negative control track pulse could indicate that they have not. The advantage of this approach is that *the video signal itself does not carry the descrambling key information.* Therefore external descramblers could not be utilized to allow owners of black recorders or players to view protected programs.

A suggested scrambling algorithm is as follows: each of the two possible states - color difference signals exchanged and color difference signals not exchanged - should last for a *randomly* chosen integral number of frames. from 4 to 8 inclusive. For example, 5i 7n, 4i 4n. 6i 5n. 8i 8n, 7i 4n, etc., where "i" means color signals interchanged and "n" means not interchanged. The resultant Authenticating Signature therefore ranges in frequency between one and four Hertz approximately. The Authenticating Signal detector should be designed to generate an output for signals in this range only.

Embodiements of Conditional Play Systems

Referring to Fig. 1. a disc 12 (or a digital cassette, not shown) is played back in a conventional way in a disc player. This produces a bit stream output and the read head is kept on track by a Tracking Servo System 14. The bit stream is conventionally demodulated by Demodulator 18. The digital output 20 of Demodulator 18 is coupled to an MPEG Decoder 28 and a Copyright Signature Detector 22. The digital signal 20 is a compressed video bit stream which is decompressed by the conventional MPEG Decoder 28. The output of the MPEG Decoder 28 is coupled to D/A Converter 30 for outputting an analog signal. This signal may or may not have analog copy

protection added to its output using techniques described in US Patent 5.315.448 ('448) by John O. Ryan. issued on May 24, 1994. entitled COPY PROTECTION FOR HYBRID DIGITAL VIDEO TAPE RECORDING AND UNPROTECTED SOURCE MATERIAL and US Patent 4.631.603 ('603) issued on December 23, 1986 to John Ryan entitled METHOD AND APPARATUS FOR PROCESSING A VIDEO SIGNAL SO AS TO PROHIBIT THE MAKING OF ACCEPTABLE VIDEO TAPE RECORDINGS THEREOF. The '448 AND '603 patents are incorporated by reference.

In addition to an analog output. Digital Video signal 35 from the output of MPEG Decoder 28 may also be provided as an output from the player, for future digital display devices.

The output of Demodulator 18 is also coupled to Copyright Signature Detector 22. The Copyright Signature Detector 22 detects the presence of a Copyright Signature in Digital Signal 20. In another embodiment, detection of the Copyright Signature may be more conveniently carried out after decompression by MPEG decoder 28, or even in the analog video domain at the output of D/A 30.

Tracking Servo System 14 assures that the optical reading head correctly tracks the information tracks. As discussed earlier, an Authenticating Signature signal is effected by wobbling the disc cutting head in a controlled manner during the recording and mastering process and this will give rise to an error component in the tracking error signal. The Tracking Error Signal 16 is coupled to an Authenticating Signature Detector 24. The Authenticating Signature Detector looks for and detects an Authentication Signal, when present.

Output A of Copyright Signature Detector 22 and Output B of Authenticating Signature Detector 24 are coupled to Decision Logic 26 to control the activation of Inhibit Play command 32. An Inhibit Play command is generated only when A is high and B is low, i.e.. when there a Copyright Signature present in the video but an Authentication Signature is not present. At all other times normal playback of the recorded medium is allowed.

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Referring to Fig. 2, the Enhanced Conditional Play System is essentially similar except for the inclusion of Descrambler 42. The Descrambling Key Signal 44 for Descrambler 42 may in one embodiment be conveyed as a special modulation of the Authenticating Signature Signal.
5 Authenticating Signature Detector 24 decodes Descrambling Key Signal 44, when present, from the Tracking Error Signal 16 and couples it to Descrambler 42. The remainder of the Enhanced Conditional Play System is identical to the Basic Conditional Play System.

Figure 3 is a block diagram of a disk mastering machine embodying the
10 Conditional Play Systems.

Video Input Signal 54 is inputted to Signal Processing Circuitry 60 and Sync Separator 62. While the Video Input 54 is generally assumed to be a digital video signal, it may be an analog signal. The Sync Separator 62 detects and separates out the synchronizing signals from an analog or digital
15 signal. The output of Sync Separator 62 is coupled to Copyright Signature Generator 64 and Random Scrambling Sequence Generator 72. Copyright Signature Generator 64 generates a Copyright Signature signal 68 to be inserted in the video signal. The Copyright Signature signal 68 may be a pseudo-random binary sequence, or a spread spectrum signal or other suitable
20 watermarking method meeting the security, cost and invisibility requirements.

Random Scrambling Sequence Generator 66 is used to produce an Authentication Signal modulated by the Scrambling Key Signal (when scrambling is used in an Enhanced Conditional Play System) in Track Signal
25 Generator 72. The Scrambling Key Signal is also used to effect scrambling within Signal Processing 60.

The foregoing is a description of an improved approach to copyright protection, called the Conditional Play System. The general principles described herein, i.e. the combining of a Copyright Signature and an
30 authenticating procedure, can be applied to any of the new media being proposed as the next generation video and/or software delivery vehicles - DVD, CD-I, CD-V, CD-ROM, Digital Video Recorders, etc. For example,

Conditional Play technology could be applied to protect video and software released on the DVD format from piracy when low cost DVD recorders become generally available.

The security of the Conditional Play System makes it difficult or uneconomical for a pirate to make playable copies of protected discs.

To make playable copies of copy-protected discs, i.e., to defeat this scheme, a pirate must do one of the following:

1. Detect and remove the Copyright Signature signal from protected programs before making copies. Watermarking methods for effecting a Copyright Signature utilizing spread spectrum or transform techniques can be made highly resistant to removal, and have been described in various patents.

2. Add a viable Authenticating Signature to illicit copies as the discs are being recorded, so that compliant players will play these discs normally. This is possible, but to do so the pirate needs to make major modifications to a recorder to enable it to lay down radially position-modulated tracks. Such modifications are well beyond the capabilities of all but the most technically capable and well financed pirating operations.

As a practical matter, the ability of the Conditional Play System to reduce or eliminate piracy at the consumer, dealer and technically knowledgeable professional level, should be extremely valuable.

The Enhanced Conditional Play System which includes the added scrambling step helps to ensure compliance by manufacturers, because a non-compliant player cannot play protected media

While the above embodiments have described a Conditional Play System for optical discs, the principles are also applicable to a magnetic tape format. For such applications, the Authenticating Signature Signal could be added to the control track of the tape.

While the invention has been described in connection with preferred embodiments, it will be appreciated by those skilled in the art that various changes can be made without departing from its spirit. The coverage afforded applicants is defined by the claims and their equivalents.

I claim:

5   1.   A method of providing copy-protection for a program distribution medium comprising the steps of:

adding an authenticating signature to said medium to be copy-protected;

inputting program data;

10   adding a copyright signature signal to said program data;

recording said program data.

2.   The method of claim 1, further comprising:

scrambling said program data containing said copyright signature signal prior to recording said program data.

15   3. The method as recited in claims 1 and 2 wherein said program data comprises a video signal.

4. A method of playing a copy protected medium containing a copy protection signal and an authorization signal comprising the steps of:

detecting said authenticating signature in a media player;

20   detecting said recorded program data from said media;

detecting said copyright signature signal;

inputting said program data to a data output device when said authenticating signal and said copyright signature signal are detected; and

preventing said program data from being coupled to said output data

25   device when said copyright signature signal is detected and said authenticating signal is not detected.

5. The method of claim 4, further comprising:

detecting scrambling keys; and

descrambling previously scrambled program data.

30   6. The method as recited in claims 4 and 5 wherein said program data comprises a video signal.

7   A system of copy-protection for a program distribution medium comprising:

means for adding an authenticating signature to said media to be copy-protected;

means for inputting program data;

means for adding a copyright signature signal to said program data;

means for recording said program data on said media.

8.   The system of claim 7 further comprising:

means for scrambling said program data containing said copyright signature signal; and

means for adding a scrambling key signal to a medium tracking signal.

means for detecting said authenticating signature in a media player.

9.   A system for playing a copy protected program data on a medium containing a copy protection signal and an authentication signal comprising:

means for detecting said authentication signature in a media player;

means detecting said program data from said media;

means for detecting said copyright signature signal;

means for inputting said program data to a data output device when said authenticating signal and said copyright signature signal are detected; and

means for preventing said program data from being coupled to said output data device when said copyright signature signal is detected and said authenticating signal is not detected.

10,   The system of claim 9 further comprising:

means for detecting a scrambling key signal to a medium tracking signal; and

means for descrambling said program data containing said copyright signature signal.

11. A playback apparatus for copy-protection of a program distribution medium comprising:

a first detector for detecting an authentication detector;

a demodulator for demodulating said program data;

a second detector for detecting the presence of copyright signature signal within said demodulated data;

a third detector for detecting the presence of said authenticating signature and said copyright signature signal or the absence of said copyright signature signal;

a decision logic circuit to permit an output of said demodulated data
5   when both said authenticating signature and said copyright signature   are detected or the absence of said copyright signature is detected.

12.   A method for providing copy protection in a mastering process of a recording medium comprising the steps of:

inputting a data stream

10   inserting a copyright protection signal within said data stream;

recording said data stream on said recording medium;

generating an authenticating signature signal; and

coupling said authenticating signature signal to a time base control mechanism of a recording device to modify said time base control mechanism
15   according to said authenticating signature signal.

13.   A method as recited in claim 12, wherein said recording medium is an optical compact disc.

14.   A method as recited in claim 12, wherein said recording medium is a DVD disc.

20   15.   A method as recited in claim 12, wherein said recording medium is a magnetic tape.

16.   A method as recited in claim 12, wherein said data stream is a video signal.

BASIC CONDITIONAL PLAY SYSTEM
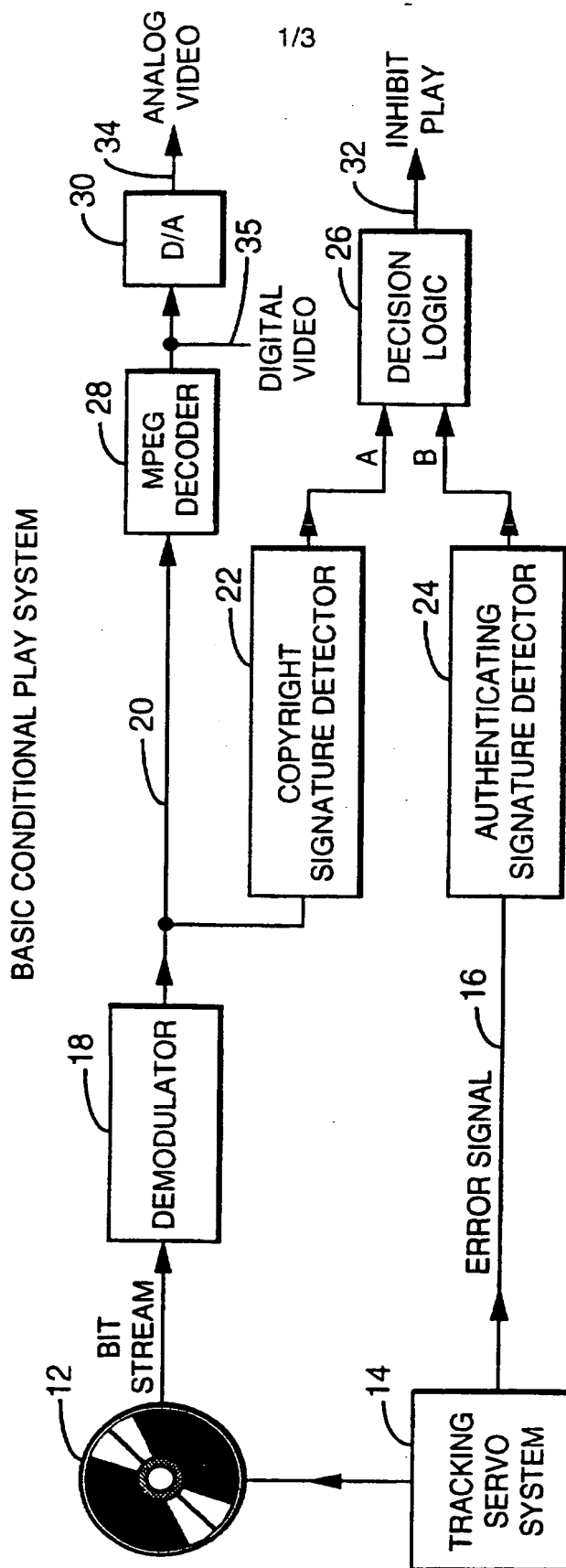
IF A IS HIGH AND B IS LOW, AN INHIBIT PLAY COMMAND IS GENERATED

FIG. 1

ENHANCED CONDITIONAL PLAY SYSTEM
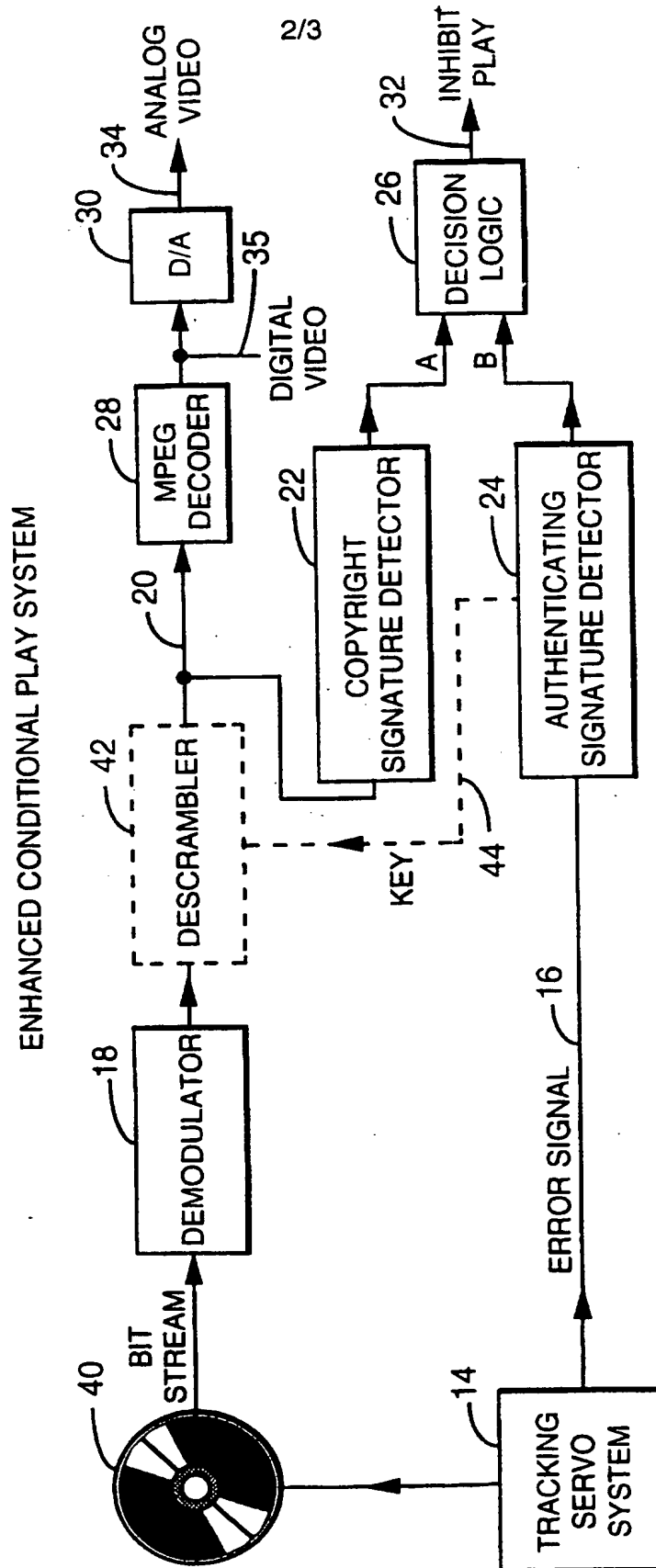
IF A IS HIGH AND B IS LOW, AN INHIBIT PLAY COMMAND IS GENERATED

FIG. 2
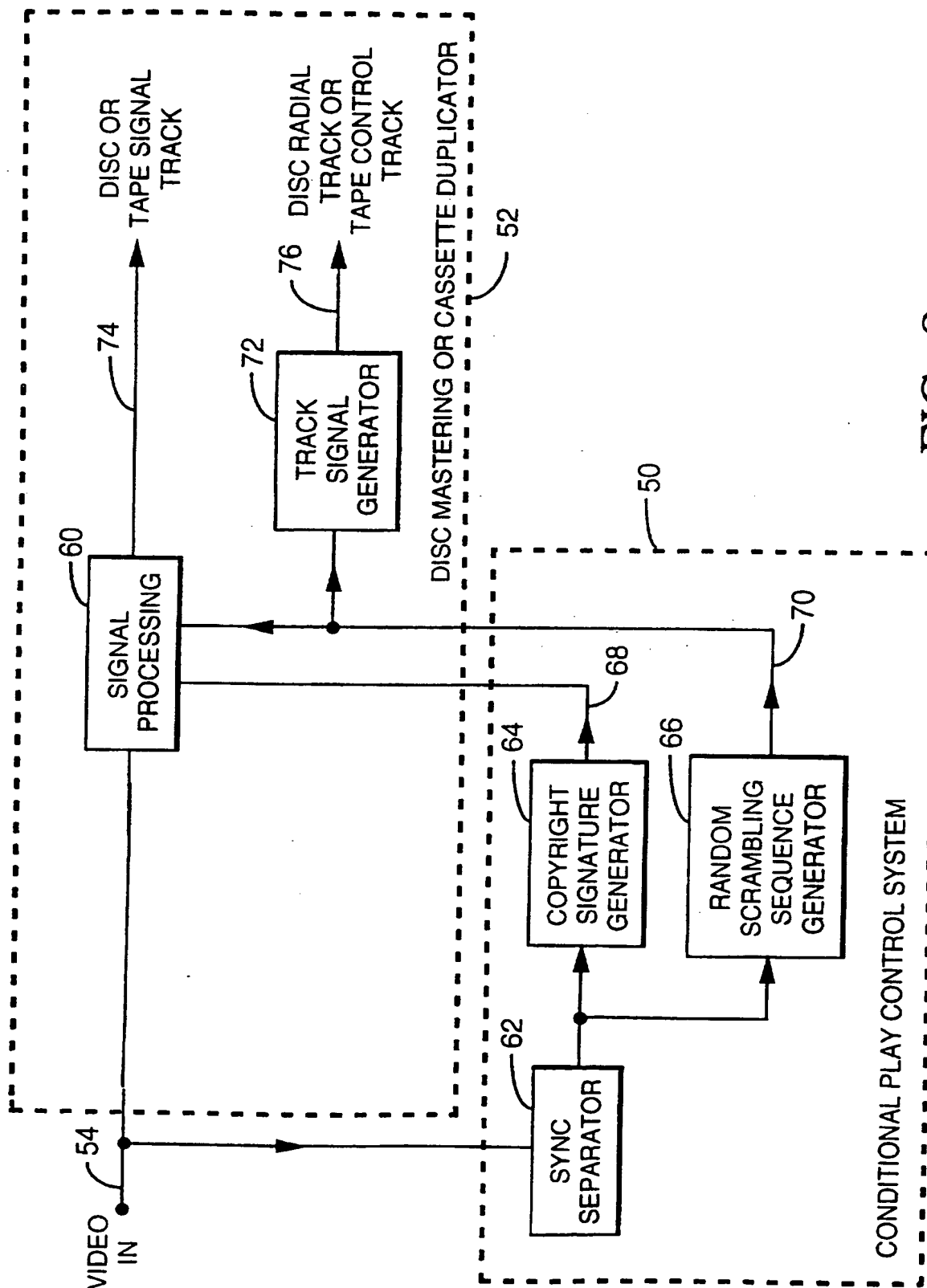
FIG. 3

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6   H04N5/913

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6   H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 96 03835 A (MACROVISION CORPORATION) 8 February 1996 cited in the application see page 10, line 23 - page 16, line 6; figures 1,2	1-7,9, 11-16
Y		8,10
Y	--- EP 0 545 472 A (N. V. PLILIPS' GLOEILAMPENFABRIEKEN) 9 June 1993 see the whole document -----	8,10

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 September 1997	25. 09. 97

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax (+ 31-70) 340-3016	Verleye, J

Form PCT/ISA/210 (second sheet) (July 1992)

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9603835 A	08-02-96	US 5574787 A AU 3127695 A CA 2195939 A EP 0775418 A	12-11-96 22-02-96 08-02-96 28-05-97
EP 545472 A	09-06-93	JP 5325193 A	10-12-93
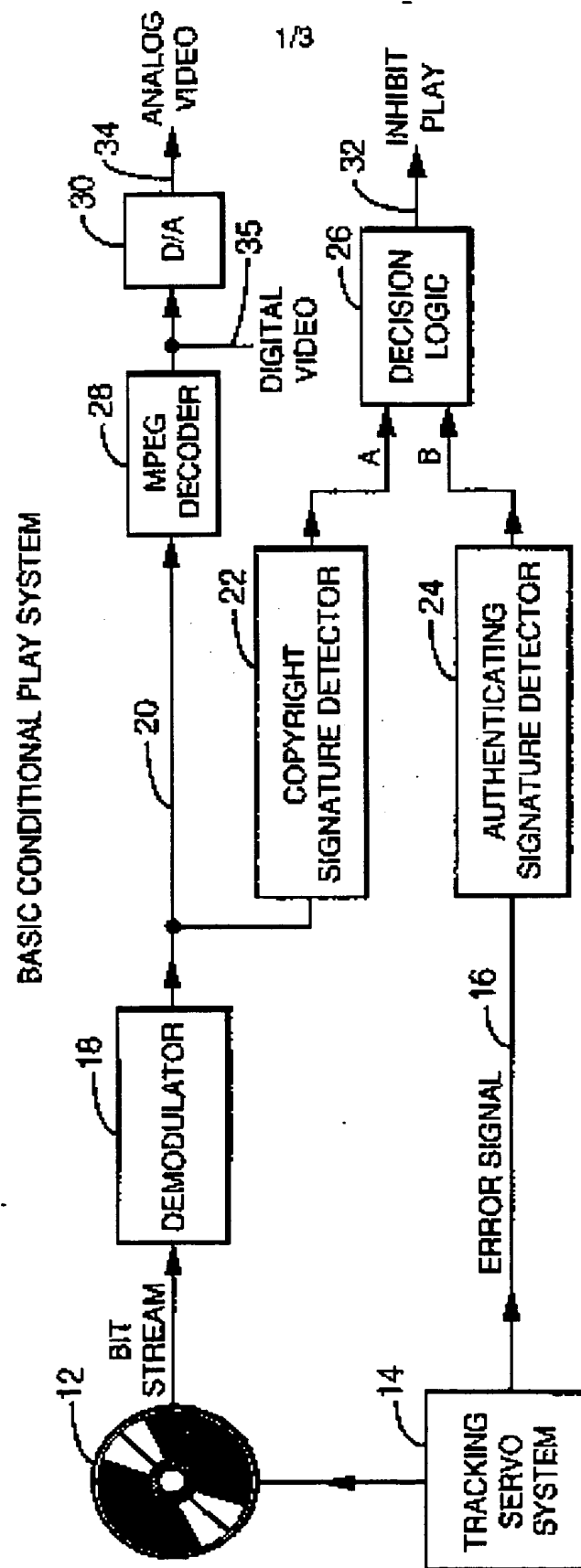
BASIC CONDITIONAL PLAY SYSTEM

FIG. 1

IF A IS HIGH AND B IS LOW, AN INHIBIT PLAY COMMAND IS GENERATED

ENHANCED CONDITIONAL PLAY SYSTEM

BIT STREAM

DEMODULATOR 18

DESCRAMBLER 42

20

MPEG DECODER 28

D/A 30 34 ANALOG VIDEO

35 DIGITAL VIDEO

COPYRIGHT SIGNATURE DETECTOR 22

KEY 44

AUTHENTICATING SIGNATURE DETECTOR 24

A

B

DECISION LOGIC 26 32 INHIBIT PLAY

40

ERROR SIGNAL 16

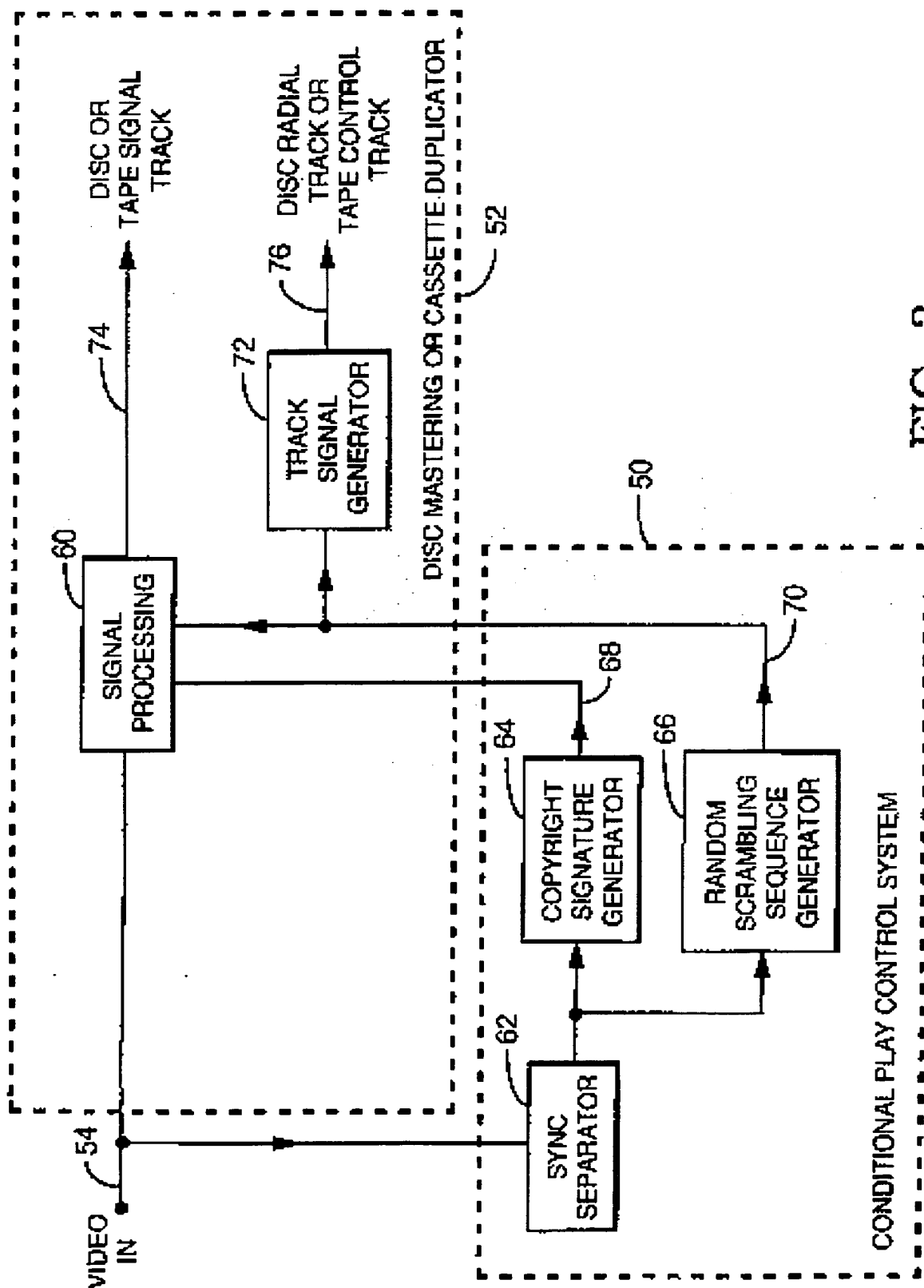TRACKING SERVO SYSTEM 14
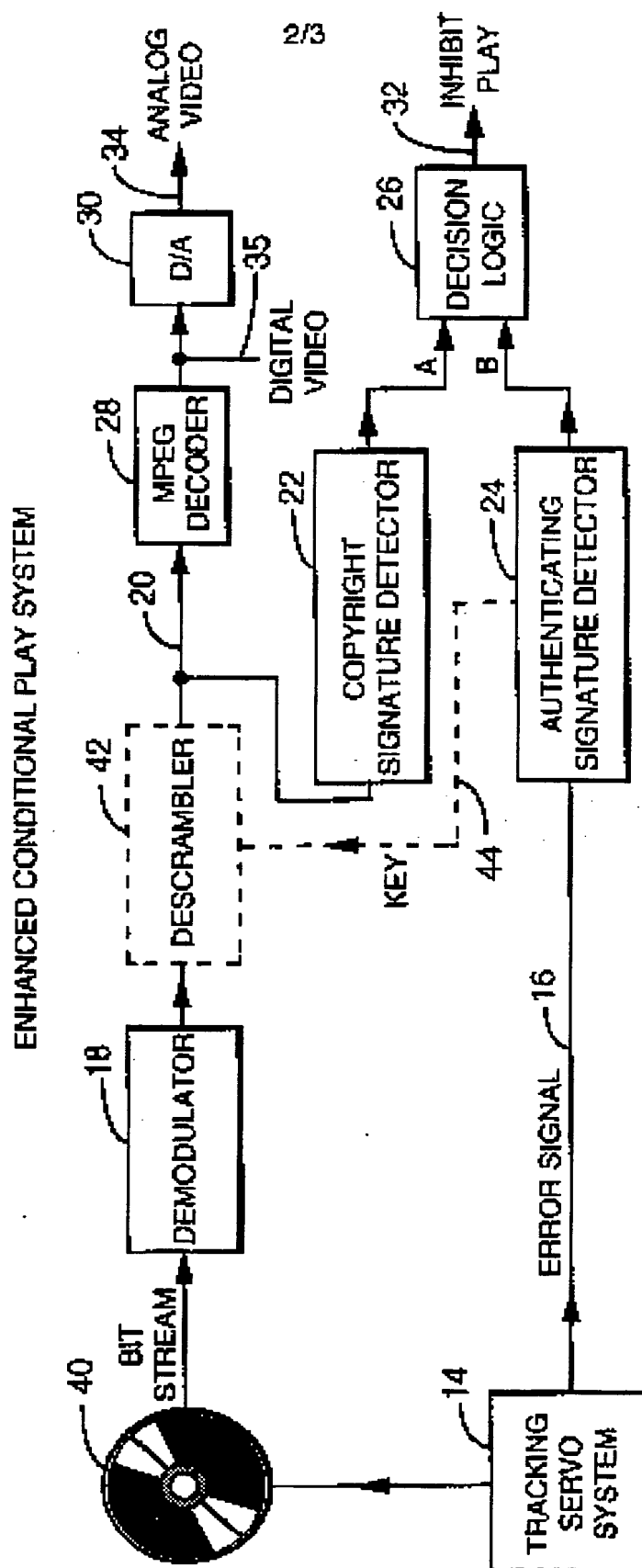
FIG. 2

IF A IS HIGH AND B IS LOW, AN INHIBIT PLAY COMMAND IS GENERATED

FIG. 3

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